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Analysis of the ways in which management affects prosperity indicates that management's contribution is underestimated.

The Growing Responsibility of Management to Our Economy

Robert E. Lewis

THE professional economist speaks of many factors in accounting for the prosperity of our country. I suppose I'm like most business men. I had economics in college, but have had little exposure to theory since then.

I would like to place particular emphasis on the role of management. When I speak of *management,* I don't mean it in the sense of business management alone. Management in all fields of endeavor has a definite impact on our total picture. This University is an excellent illustration of visionary management in the educational field. The conception of the North Campus is one of the best examples of practical long-range planning that I have ever seen.

However, because of a greater familiarity with business management, I would like to confine my observations to that area.

There are two broad areas that control our prosperity:

1. Production, and
2. Consumption.

Production depends on a number of factors —the working population, natural resources, business management, capital goods, risk-taking enterprise, and the government.

Natural resources are a matter of good fortune, and government is unpredictable.

In my opinion, the other factors revolve

About the Author—

A graduate of Columbia University (B.S., 1932) and a New York C.P.A., Mr. Lewis has been President of Argus Cameras, Inc., since 1949. In 1953 he was President of the National Association of Photographic Manufacturers.

This article is a summary of a talk given by him at the 26th Alumni Conference of the University of Michigan School of Business Administration, in Ann Arbor, May 18, 1956.

NEW PUBLICATION SCHEDULE

The publication schedule of the *Review* is being changed. Henceforth, it will be published bi-monthly during the academic year—in November, January, March, May, and July. The gist of the change is that there will be no issue appearing in September. The next issue following this one, therefore, will reach you in November.

The change is being made because the customary seasonal decline in academic activity in the late summer has created difficulties in the preparation and distribution of the September issue.

We trust that the new schedule will have the approval of our readers, and we hope that they will find the *Review* a service to the American private enterprise system.

—Michigan Business Review

substantially around good management. The very essence of risk-taking enterprise, and the formation of capital goods, is good management. I am also of the opinion that management has a profound influence on the efficiency of the working population.

Recent Progress in Management

The development of management has, of course, been taking place over a period of many years.

However, the greatest progress has been made in recent years. World War II and the Korean episode gave a substantial impetus to the movement, and the activity in *management development* since then has been amazing. This Conference is a typical example of that activity.

The University of Michigan School of Business Administration, and many others, have broadened their scope for all students and are offering many opportunities for mature businessmen to improve their knowledge and share experiences with other businessmen. The American Management Association, the National Association of Manufacturers, and many other organizations, are doing an extensive job on all kinds of business seminars. In addition to these sources of management education, many companies are carrying on training programs of their own at all levels.

Important Forms of Improved Management

In what forms, then, are these improvements in management ability showing themselves? I feel the important ones are:

1. Organization planning,
2. Long-range fiscal and operational planning.
3. Stabilization of employment,
4. Management education and training of employees,
5. Increased research,
6. Equipment improvement,
7. Striving for innovation in all phases of the business, and
8. Public responsibility.

All these important managerial concepts add up to the fact that American business today is dynamic, plans courageously for future growth, and plays to win.

Expansion and Development

Do you remember the period at the end of World War II when nearly everyone worried about excess productive capacity? We added to it after World War II, and then at the time of the Korean crisis we again substantially increased our productive facilities.

The truly amazing thing is that on top of all this expanded capacity we have continued to add hitherto unheard-of values. Business plant and equipment expenditures are scheduled to total $39 billion this year, exceeding 1955, which was itself an all-time record, by 30 per cent. The evidence suggests continuing large outlays in 1957.

The very boldness of business plans for expansion has, in my opinion, had a great bolstering influence on what might have been a negative attitude on the part of our economy.

You undoubtedly remember January of 1954, when Harlow Curtice announced the General Motors Program of one billion dollars. The effect of that announcement was quite obvious.

There is little reason to doubt the firmness of these business expansion and modernization plans. They are parts of long-term programs for cost-cutting, introduction of new products, and supplying growing markets.

Stability and Productive Efficiency

In talking about economic stability and increased productive efficiency, it is difficult to determine whether the chicken or the egg comes first.

We now find that stability of employment not only is a more pleasant way to operate and fulfills a social responsibility; but even more important, it is becoming increasingly a business necessity. When you contemplate unemployment insurance, supplementary unemployment benefits, pensions and other la-

bor add-ons, it becomes an expensive situation to have your labor force go up and down sharply.

Another force that is driving management to greater accomplishment is the constantly increasing wage and salary cost. In order to support our high labor cost in the world market, we wage a ceaseless battle for labor-saving tools and equipment.

The need for stability of employment, the drive for labor-saving operations, and the challenge of expanding population and markets, have made it necessary for American businessmen to be long-range planners—men of vision and courage.

My own business is an example of what I mean. In manufacturing cameras, we pay an average wage of about $2.50 an hour. In Germany the average wages are about 48 cents an hour, and in Japan, about 22 cents an hour. To compete in this kind of a situation we are forced to know our markets, make long-range plans and forecasts, invest substantial sums in tooling and equipment, and have confidence in our merchandising ability. We have to be right, and we have to play to win.

Selling the Goods

I've been talking mostly about production. Now I'd like to touch on consumption. All the production genius in the world would get us nowhere without the consumption to match it.

The one thing that sets us apart from the rest of the world economically is a combination of competition and merchandising ability. Our merchandising methods build strong brand names. A strong brand name is only as good as the product and service over a period of time.

A strong brand name enables a manufacturer to sell sufficient volume to permit efficient equipment and tools, which in turn permit a low price to the public. The basis of the American economy is large volume. If our foreign competitors enjoyed the same volume that we do, it wouldn't take them long to be just as efficient on tools and equipment.

Management's Increasing Effectiveness

American business management is increasing its effectiveness in a number of ways—

1. The increasingly high costs of fluctuations in production encourage stability of employment.

2. Constantly increasing wages and salaries force a ceaseless search for innovation and automation.

3. The steady improvement in management technique and understanding has enabled better planning for the future.

4. Our merchandising skill, combined with constantly lower prices, enables us to keep consumption paced with productive capacity.

Management's Importance Underestimated

This has been a thumbnail review of my conception of an important phase in the American economy and how it is affected by management.

An analysis of our $400 billion output of goods and services shows that 65 per cent is represented by consumer purchases, 17 per cent by business purchases, and 18 per cent by government purchases. In other words 82 per cent of our economy is directly influenced by business management.

I offer for your consideration as a new economic concept, that perhaps the importance of management has been underestimated in our current economic picture.

Skillful use of modern electronic dictating equipment has many advantages.

How to Talk Your Work Away

Ray Josephs

IF you are in any business which requires communication of ideas from yourself to others, or needs the gathering of information, you'll find no greater time saving device than modern electronic dictating equipment.

Perhaps you've thought of these devices as expensive instruments used only by top-pay, high-powered tycoons. Many such men and women do use dictation machines with great effectiveness. For no function of an executive is more important than putting his thinking into writing. But they work just as well for business people in almost any field.

Not so many years ago, a majority of business men with letters to do and material to write employed shorthand dictation. It was the only system available. Yet the method was inconvenient. For old-fashioned dictation robbed the executive of his independence of action. It was, and is, strictly a two-party operation.

Disadvantages of Shorthand Dictation

Your secretary, for one thing, had to be immediately available before action could begin. And all too often, inspiration and ideas waited and grew cold because the girl was busy. To avoid constantly interrupting your secretary's work, you had to save your dictation until a set period. This forced a work pattern based on secretarial convenience. Often it had a stifling influence on thinking behavior. Thoughts couldn't be converted into recorded form whenever required. In many cases, work piled up, for using the shorthand method, jams were inevitable.

Secretaries, for instance, couldn't possibly take shorthand dictation while doing something else. And, particularly in smaller offices, the fact that two or more men wanted to dictate at the same time frayed dispositions and slowed down output all along the line.

All of this brought about a need for dictating instruments—to help the executive better perform one of the most valuable phases of his work: the transferring of thoughts, opinions, experience, and ideas to others.

In recent years, dictating devices have been perfected step by step into marvels of efficiency.

But I think their greatest increase has come because of their ability to give you a method of *talking your work away*—a facility at your fingertips for taking action immediately and for gaining valuable dividends of time throughout the entire business day. Using electronic dictation effectively gives you a clearer desk and a clearer mind. You become a person who doesn't keep ideas in cold storage—but who constantly spreads your thinking to aid others in their work.

You are able to plan, organize, and get things accomplished more effortlessly and in less time.

Time-Saving Dictation Methods

In the course of contacting many executives on their time-saving dictation methods, I have

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About the Author—

Lecturer, public relations consultant, and author of books and magazine articles, Ray Josephs draws on his own and others' experience to suggest how to get things done. His latest book is ***How To Gain An Extra Hour Every Day,*** in which he reports the time-saving methods used by busy and prominent people.

gathered together a group of ideas that may be useful whether or not you are a present user of such equipment or have simply thought about employing it for your own needs.

But before going into specifics, let's examine some of the basic facts about dictating devices. Only then can you best judge how these methods can work for you.

1. Writing or communicating through dictating devices is entirely different from personal shorthand. Your machine is constantly there before you. Or, using the new methods available in some large offices, you simply talk into a "dictation telephone" and a centrally-placed machine records what you have to say. So there's no delay or cooling-off period while you wait for your secretary. The ability to dictate immediately is, I think, by far Asset Number One.

2. Whatever the method, you don't have to slow down to your girl's shorthand speed. You dictate at your own natural pace. A machine never says, "Sorry, Mr. Josephs, I missed the last few words." The dictation record captures everything without interrupting or destroying your thoughts by asking you to repeat.

3. As you dictate, you can pause as often as you like, make changes without embarrassment or apology. All machines have a little correction key which cuts a warning signal in an illuminated index strip or on a tiny marker to give advance warning to your transcriber of just when changes are coming.

4. Without someone at your elbow hanging onto your words, there's no "shorthand fright." You concentrate better. Words and phrases come far more smoothly and readily. All this adds up to getting more done, more quickly, and usually better.

5. With the dictating machine at hand, you can take action on upcoming matters the moment they cross your desk. Instead of postponing actual action until a scheduled dictating period, or until your secretary and her shorthand notebook are free, you move as fast as you please. Things don't pile up. Fleeting ideas are stopped alive in their tracks. You simply speak them into your machine without risk of forgetting.

6. Whether it's early in the morning, or late at night, during the business day, after hours, at home or even in your car, plane or train, most of the devices are now portable, ready to go to work and serve you whatever the hour, wherever the place. You have something more dependable than a perishable scratch pad. Ideas once lost are saved and put to use for you and your business.

Dictating Correspondence

Most users of dictating tools think of them primarily for letters and correspondence. That's true, although there are many other uses, as I'll describe subsequently. But first, let's see how you can use this device more effectively for correspondence, since this is the major assignment.

Harry Doniger, President of McGregor Sportswear, one of the largest firms in the world in its field, has worked out this system.

After his secretary opens and sorts the day's mail into major groups, Harry looks it over and decides what requires immediate action. He then dictates drafts of answers to the mail. These are typed on green paper and sent with the file of previous correspondence, to anyone who needs to read or add to the draft.

Admittedly those rough drafts are *very* rough, but Harry finds that getting something down on paper helps crystallize his thoughts.

When his secretary returns the typed drafts and files to Harry, he can dictate final drafts of the letters.

This method of dictating an immediate first draft rather than starting a series of memos around often cuts or eliminates several intermediate steps. In other words, Harry Doniger jumps as far as possible toward the ultimate objective rather than going through the in-between steps. While the final letter will undoubtedly be changed one or more times before it reaches completion, it thus represents a clearer, more direct, better thought-out result.

Instructions to Others

Whenever you have instructions to give others, electronic dictation can save you time and effort. Instead of lifting the phone, or pressing a buzzer, or writing a longhand note, you can just reach for your microphone. You then talk to your associate, branch manager, salesman or plant foreman, secretary—or anyone anywhere—as though he were right there with you.

What you say can be transcribed and delivered as a memo. Or you can put the disk or belt into an envelope and mail it. Dictated reminders to your secretary are often never typed—the machine is a handy way to tell her things without waiting for her to drop everything and come into your office and listen.

Telephone and Writing

Much of today's outside business is done by telephone—important decisions, binding agreements, substantial orders. This is perfectly natural. The telephone is a wonderfully convenient means of voice-to-voice contact over any distance. But it's definitely a dangerous way to do many kinds of business. Spoken words are forever lost in the ether. Neither party has a solid record of commitments or promises. The hazard is obvious—and highly unnecessary.

If you simply flip the switch that makes many dictating machines into telephone recorders, and record what is said, you will have a permanent confirmation of 'phoned orders, instructions, and vital information.

Or, you may dictate a letter to your party while you are talking to him on the telephone. For instance, a call comes in requesting several different materials. While the man placing the order listens, you dictate a letter saying what you are sending. He can correct any errors you make; your secretary doesn't have to be told verbally what needs to be done; and a follow-up record is provided—all in one step.

Another new telephone use of dictation is demonstrated by Austin Nichols, Brooklyn liquor wholesalers. They've just installed a special switchboard connected to nine recording machines. The firm's 60 salesmen now phone their orders through the switchboard—and where it originally took as long as 30 minutes to place nine separate customer orders, it now takes three. The firm feels it will save at least $8,000 annually in time alone, plus giving better service to customers and salesmen.

Reporters on newspapers can use the combined dictating machine-and-switchboard to 'phone in "scoops" without waiting to talk to any one person. Many more calls can come in at one time and be handled immediately in this way.

Saving Meeting Time

Conferences and meetings are the bane of many a business man's existence—as well as time wasters for anybody involved in community and other organizations. Yet pooled opinion is often the only way to arrive at proper democratic decisions.

Dictating devices can help speed up such matters. Notes dictated to participants, suggesting topics for consideration, get thinking processes started before the meeting starts, and help prevent "snap judgments."

A dictating machine used at the meeting in place of a secretary serves two purposes. First, the secretary need not sit through the long preliminary discussions; and second, if only the chairman's summary of conclusions reached is recorded at various intervals, the participants profit from the summaries, and only the most pertinent points are set on record.

Organizing Ideas

Anybody anxious to get ahead in business succeeds to the extent that he's creative—and can help translate ideas into action.

What comes out of his head and is transmitted to others makes his efforts effective. If he's not free to act when he can at any hour, day or night, an extensive portion of his potential is lost beyond recovery.

To create most effectively requires organiz-

ing yourself to think out action in articulate terms as ideas occur. Good ideas and plans aren't usually perfect the first time they are expressed. I have heard of some men and women able to think through an idea completely in their heads before they get around to writing it. Fine, if it works. For most of us, however, getting it down on paper helps as no other method does.

If you dictate ideas onto belts as they come to you, a collection of these belts can serve as a foundation for a speech, a new book, a summary, a company report, and many other long composing jobs which become even longer when you have no ideas to start out with.

Dictating While You Travel

If you carry a portable dictating machine when you travel, and work in your car, on the train, in a plane, anywhere you find yourself with time to spare—you will be less likely to come home to find a pile of work waiting. Machines of all kinds are equipped with transformers that allow them to be used on the power of your car, train, or plane.

Using Dictation Without a Secretary

Many business men and others could use the services of recording devices but don't have enough work to keep a secretary busy full time. For them, a number of specialized services have been developed.

Robert E. Trattner of Indianapolis thought that dictation devices might be the link between the business man short of secretarial help and the ex-secretary desirous of earning money on her evenings and weekends. Trattner started by running a small classified ad seeking interested secretaries. He was deluged by 600 replies. Next he tried lining up business men. Again the idea clicked. Now Trattner has 400 secretaries in a dozen cities and 15 additional towns are being set up.

Unique Ways of Using Dictation

There are many unique methods of using dictation to talk away your work via electronic devices. Here are some, all of which will suggest ideas to you: doctors and hospital staff members can record medical data about patients "on the spot" and have them set into the records later; lawyers can prepare case briefs without the presence of a secretary; researchers can record their notes as they go over their source material, rather than writing out elaborate note cards; and recording belts can be mailed "as is" to another company, where they may be placed on transcribing machines and listened to—the spoken word sometimes carries a more forceful message than the written letter. Many other ideas, involving your own line of work, will undoubtedly occur to you.

In conclusion, it would seem that dictation machines have it over the shorthand method in saving time, energy, and expense. Whether you want to write an effective business letter, convey explicit instructions, keep complete, concise files, hold a top-notch conference, or save employees' and your own time—in short, to make the best use of your imagination—dictating equipment will help you to *talk your work away*.

MACHINE-COINED NAMES

An electronic machine has been used to coin names for new chemical products and has produced a dictionary of 42,000 of them.

—*Looking Ahead Toward Better Things to Come*, Vol. XIII, No. 4.
Published by Second Bank—State Street Trust Company, Boston, Massachusetts.

Does the national interest call for less regulation of transportation? This question is causing a . . .

Tempest in Transport

John C. Kohl

A storm is raging in the transportation industry of this country. Gusts of high-powered speeches blow through our lecture halls; a veritable deluge of propaganda washes out real news in our daily papers; ever-mounting piles of debris contain hundreds of pamphlets, newsletters, and other literature swept on by this tempest in transport.

Threatened by the ill winds of this storm are the shippers of this nation—the suppliers, manufacturers, distributors, and retailers whose very existence today demands dependable and comprehensive transportation service. Any sudden disruption of the orderly flow of raw materials and manufactured goods would be a severe blow to business.

While the situation is not yet critical, ominous clouds portend trouble. Storm warnings should be flying and every businessman should keep a weather eye open to detect any movement which could bring drastic changes for the worse in our patterns of transport regulation.

To continue this weather analogy, the storm center, which was discovered in Washington only in 1955 and still hovers there, is the so-called "Cabinet" or "Weeks" report to the President recommending revision of Federal Transportation Policy. So much dust and dirt have been stirred up that few people have had a clear look at the tempest itself.

About the Author—

John C. Kohl is Professor of Civil Engineering and Director of the Transportation Institute in this University. This article is adapted from an address delivered by Professor Kohl before the Flint Traffic Club on February 16, 1956.

Just what is this "Cabinet Report" and why has it created such a storm over National Transportation Policy?

Why Have a National Transportation Policy?

First, it might be well to deal with the question "Why do we need a National Transportation Policy?" And to answer that question, it is necessary that attention be directed toward regulation of transportation in our presumably competitive system of free enterprise.

Almost a century ago, it was recognized that competition alone could not assure the adequate, low-cost transportation system so absolutely vital to the maintenance and expansion of our economy. In theory, if true competition were at work, a shipper, on finding the rates too high by for-hire transportation services could resort to his own private transportation—the cost of performing this private service would set a ceiling above which commercial agencies could not charge.

In a railroad-dominated transport era, however, this theory did not work. To gain competitive equality, a shipper would have had to build and run his own railroad. Even the corporate giants of 19th Century United States were unable to accomplish more than a few miles of private switching tracks. Andrew Carnegie tried to establish competition with the Pennsylvania Railroad from his Pittsburgh steel plants to the Atlantic seaboard. His resources, great as they were for the times, were inadequate; his South Penn Railroad was

abandoned during construction and fifty years later became the location of the original stretch of the Pennsylvania Turnpike.

Growth of Governmental Regulation

The competition among the railroad systems, instead of providing relief for the shippers in the form of reasonable and stable rates, brought on vicious practices which threatened every advantage the technical advances in transportation offered. Protection of the public—"the public interest"—demanded governmental controls to curtail ruinous competition. Regulation, under Federal and state laws, was designed to protect the user of for-hire transportation services from excessive charges and discriminatory treatment as well as from dangerous operating practices.

As newer forms of transport created new problems, so were regulatory concepts and laws gradually expanded. Nevertheless, transport situations have been changing so rapidly in the years since 1900 that it has been impossible to spell out in exact legal language every detail of regulation, or to anticipate changes from the circumstances when laws were written and before they could be revised.

As a guide to regulation, which is an accepted fact in our economy, it has proved necessary and desirable to outline policy under which the Interstate Commerce Commission can establish practical regulatory rules, and under which the courts can interpret any legal questioning of such rules.

Essential Safeguards in National Policy

Ideally, the expression of national transportation policy by the Congress, should be entirely from the public interest, not to aid or combat any special group, and should also be consistent with our American philosophy of private enterprise. In line with these principles, a truly national policy would include these safeguards:

1. Regulation of transport should always be the minimum necessary to protect the public interest, and under no circumstance should there be a transfer of managerial functions to governmental officials.

2. Regulation should not interfere with the privilege of the transport user to select the agency which, in the user's judgment, best meets his need, nor to prevent his privately transporting his own goods.

3. Regulation should not stifle initiative in developing new and better transport services, nor in discontinuing obsolete and unused services.

Regulation in our American scheme of business cannot be regarded as an absolute guarantee to the public that everyone, everywhere can have all kinds of transport services whenever wanted, regardless of the degree of use. Nor can it be regarded as a grant of any vested right to success on the part of every carrier under regulation. The privilege of "going broke" is still a fundamental American right, though there are an alarming number of citizens who seemingly want that privilege revoked.

The Transportation Act of 1940

After years of consideration, there evolved a comprehensive statement of National Transportation Policy as the preamble of the Transportation Act of 1940, when the Interstate Commerce Law was last broadly amended. That there be no misunderstanding of the present policy which Congress established over 15 years ago, here are the exact words:

"It is hereby declared to be the national transportation policy of the Congress to provide for fair and impartial regulation of all modes of transportation subject to the provisions of this Act, so administered as to recognize and preserve the inherent advantages of each; to promote safe, adequate, economical, and efficient service and foster sound economic conditions in transportation and among the several carriers; to encourage the establishment and maintenance of reasonable charges for transportation services, without unjust discriminations, undue preference or advantages, or unfair or destructive competitive practices; to cooperate with the several States

and the duly authorized officials thereof; and to encourage fair wages and equitable working conditions; all to the end of developing, coordinating, and preserving a national transportation system by water, highway, and rail, as well as by other means, adequate to meet the needs of the commerce of the United States, of the Postal Service and of the national defense."

It is this carefully worded, yet sweeping statement that the 84th Congress is asked to revise. The proposed revisions are the outgrowth of the so-called Cabinet Report—the storm center mentioned earlier.

The Proposed New Policy

Specifically, this report of a special "Presidential Advisory Committee on Transport Policy and Organization," under the chairmanship of the Secretary of Commerce, Sinclair Weeks, recommended a completely new statement of national transportation policy, much of it a rewording but actually no substantive change from the 1940 statement, and arousing no disagreement. In fact, there can hardly be any exception taken to the paramount *objective* of the study by the Committee:

"——the maintenance of a sound and vigorous common carrier transportation service by all of the available means of transport; each operating within its respective capabilities and developing in accordance with the indicated demand for its services."

The controversy over the Cabinet report and ensuing legislative proposals in Congress rises on the method of attaining such a desirable objective. Since the key to regulation is *control of rates,* it was proposed that the use of stipulated rates established by the Interstate Commerce Commission as "reasonable charges" give way to a new policy of "increased reliance on competitive fares of transportation in rate making."

While the railroads interpret this proposed policy as one of emancipation from the straight jacket of regulation, the motor carriers—with some support from water carriers —see it as a virtual abandonment of rate regulation and the removal of all equality in competition.

Views of the Truckers

It is the official view of the American Trucking Associations, as stated in their "Preliminary Analysis of the Interstate Commerce Act as proposed to be amended by S. 1920," that—

"The railroads, relying on their vast financial resources and diversity of traffic, would be enabled (upon application of this new policy—JCK) to cut their rates on competitive traffic without which other modes of carriage could not long survive . . ."

"Rates on comparable items would bear no relation to each other, intercarrier competition becoming the primary classification and rate determinant . . ."

"Manufacturers and jobbers (i.e. the shippers) would be deprived of stability in the rate structure as the value of service would cease to be a factor in rate making . . ."

"Under this new approach the ICC must stand aside and allow carriers to bleed themselves to death if they wish to do so."

Or as Neil J. Curry, ATA's 1955 President, more bluntly stated last fall, "The law of the jungle will have been substituted for the constructive federal regulation and controls which have made possible the orderly development of our nation's transport."

Attitudes of the Railroads

Opposed to these gloomy views are those of Holcombe Parkes, President of the Railway Progress Institute, who recently stated, "If railroads are given the freedom to run their own business in true American fashion, if they are granted the right to compete on equal terms and price their service to reflect their inherent advantages, the industry will enter a golden age of increased usefulness of real and continuing prosperity. . . . This is the first real effort to project American style competition into transportation."

The Association of American Railroads con-

tinues this provocative theme with a catchy slogan: "Why Not Let Competition Work?" Advertisements, sponsored by the AAR and other railroad groups, are now appearing with such phrases as "Bringing Things More Nearly Into Balance," and likening the purchasing of transport service to that of commodities—TV sets and sugar—which are priced competitively.

How Would This Competition Work?

Much is to be said for the railroads' contention that they are burdened by regulation and that their load of restrictions should be eased. Yet there is much truth in the truckers' arguments that competition in transport, as it might be construed under the proposed policy, could be ruinous in the long run, or it would at least prevent orderly adjustments to new conditions.

Free competition, in our present transport world, would create even more chaotic conditions than now exist. In spite of our excellent and extensive facilities and services of both private and commercial transportation our tariffs and rates are a highly complicated maze of rules, agreements, exceptions, compromises, and revisions. Competition has had its part in shaping these charges, but the economic forces on the one hand and the political ones on the other have so obscured its role that I question whether we really understand its nature in transportation.

Competition and Rate Making

J. Monroe Johnston, former chairman of the ICC, recently indicated that concepts of competition in transportation are shifting from inter-agency competition (rails vs. trucks vs. pipelines vs. air vs. other). As a result, the entire range of forces influencing the pricing of transportation service — rate making — is also shifting.

Tables I and II indicate the shift in relative portions of both freight and passenger business handled by the commercial inter-city carriers. In 1930, the railroads were the dominant agency; while in 1954 (latest year for which statistics are available) they had lost considerable traffic to other carriers. Only during the war years was there an interruption to the downward trend in the railroad share. Otherwise, the forces of competition were at work.

Fifty years ago, the principle of "charging what the traffic will bear" was the generally

Table I

Estimated Distribution of Inter-City Commercial Freight Traffic in U.S.A.

Year	Railroads*	Trucks	Great Lakes	Inland Water	Pipelines	Air	Total
1930	75.2%	3.9%	13.7%	1.8%	5.4%	—	100%
1940	62.1	10.2	14.3	3.7	9.7	—	100
1944***	69.5	5.4	9.8	2.9	12.4	—	100
1950	57.0	16.2	9.6	4.9	12.3	**	100
1954	51.5	19.2	7.9	5.8	15.6	**	100

*includes elec. railroads.
***Wartime Restrictions in force.
**Less than 0.1% of total ton-miles

Table II

Estimated Distribution of Inter-City Commercial Passenger Traffic in U.S.

Year	Railroads*	Buses	Airlines	Water	Total
1930	74.6%	18.0%	0.2%	7.2%	100%
1940	67.1	26.5	2.8	3.6	100
1944**	75.8	20.8	1.7	1.7	100
1950	51.6	33.8	12.7	1.9	100
1954	45.5	27.0	25.3	2.2	100

*Includes Electric Railways
**Wartime Restrictions in Force.

Sources—Interstate Commerce Commission; Office of Chief of Engineers, U.S. Army; Civil Aeronautics Board—as compiled by *Yearbook of Railroad Information.*

accepted and valid approach to establishing a rate. Today, not only is that principle politically distasteful, but also it is largely unworkable. High grade traffic now tends to move at rates more greatly influenced by cost of service than by value. Our difficulties lie in determining even approximately in many cases just what the costs of service are—the regulatory body is without yardsticks to measure interagency competition.

Some Seemingly Simple Questions

Until we can answer some of the seemingly simple questions, we had better go slow in discarding our present rules. Tell me if you can how much the trucker should pay for the cost of the Interstate Highway System and how such costs should be considered in setting a rate, say from Flint to Chicago. What relation should that rate bear to rail or air which incur costs of an entirely different nature?

Regulation of rates in an era of competition is, in some aspects, about like the handicapping of horses in an attempt to keep the contestants closely matched. Unless they are running on different tracks, and in other competition, they must all be racing under the same rules. The handicapper has the important job of seeing to it that competition is on a reasonably even basis—that all horses have, at the start, an equal chance of winning and losing.

More Knowledge Needed Before Changing Policy

Perhaps, our transportation handicappers—the ICC and other regulatory bodies—need some new ground rules; but before that they desperately need to get all the horses on the same race course, and know a lot more about the entries.

Today, in spite of the high-minded policy of 1940, Federal regulation of transport is neither unified nor consistent. Virtually all railroads, a portion of the trucking industry, some carriers on inland and coastal waters, and a few pipelines, are under the jurisdiction of the ICC. Other truckers, and a large share of inland waterway operators, are exempt from all but safety regulations. Ocean shipping and the airlines not only are regulated but are promoted by other public agencies. Under these diverse controls, there can be no accurate measure of competition and hence no readily established basis for rate comparisons.

Instead of building war chests to support selfish campaigns for revision or retention of certain transport policies, the railroads and truckers might better contribute a small fraction of such funds for broadened studies of new approaches to transport pricing, for finding answers to many of the now unanswered basic questions. Only with better knowledge through objective transportation research can we place increased reliance upon competitive forces and have confidence that we can control them in the public interest—your interest and mine.

And under this current tempest in transport, let's hold fast and not be carried away by emotional winds. A sound roof of regulation is a good protection—let's not rip it off during the storm!

TRANSPARENT DIRECT-MAIL ENVELOPES

A transparent plastic envelope with a paper facing for the address is being made for direct-mail advertising. It makes it difficult for the addressee to throw it away without seeing the nature of its contents.

—*Looking Ahead Toward Better Things to Come*, Vol. XIII, No. 5.
Published by Second Bank–State Street Trust Company, Boston, Massachusetts.

Survival and growth of a business in our rapidly changing economy require forward-looking management.

Managing for Tomorrow

Charles E. Gibbons and Henry C. Thole

THE economic and social climate in which businessmen operate is changing constantly. Changes within the economic system that affect business firms include new products and services, technological improvements, business cycles, changes in costs, and changes resulting from action by competitors. External factors such as wars, threats of war, and inflationary or deflationary action by the government also influence the operation of business firms.

These changes present problems of adjustment to every business firm. Instability in the economy causes instability in the individual firm. A period of rapid growth means that most firms must increase sales, obtain new capital and facilities, increase production, and employ more workers. Conversely, a period of contraction means that most firms must curtail expenditures, decrease production, and lay off workers.

While such changes are commonly associated with booms and depressions, they are actually occurring all the time. New products, new methods, and new ideas appear continually; and the competition they foster, the failures they cause, are part of the never-ending process of change.

Change as such is not new, of course; the world has always been changing. It is only that the pace of change is now increasing so rapidly. Big opportunities that formerly occurred perhaps once in a lifetime may now confront a business manager any day. And if the chance of big success comes often, the chance to miss the boat, and thus to fail, comes equally often.

Dynamic Planning

Dynamic planning is planning that anticipates the future, and is constantly revised to meet changing conditions. Planning is not a function which can be performed once and then be forgotten. Competition and change in the economic weather demand constant planning and revision of plans.

There is a current trend for management planning to become more long range in character. One of the important factors contributing to this trend is the growth of the economy. Increasing population and rising standards of living mean that there will be a greater demand for products in the future. Managers are motivated to increase or at least to maintain their share of the market. Long-range requirements for buildings, equipment, and manpower must be established. Advertising and pricing plans aimed at expanding the market must be made long before they are put into effect. Decisions on such matters are likely to commit men, money, and machines for long periods into the future.

Another factor that makes long-range planning necessary is that most manufacturing businesses require large capital outlays. Auto-

About the Authors—

Both writers are members of the staff of the W. E. Upjohn Institute for Community Research, Kalamazoo, Michigan. Dr. Gibbons is Industrial Program Director, and Mr. Thole is Industrial Project Director.

This article is based on material which will appear as the editors' introduction to a book of readings, *Business Action in a Changing World,* to be published this summer by the Public Administration Services of Chicago.

mation and increasing labor costs tend to make it profitable to increase capital expenditures still further. Recovery of these costs must be spread over a long period of time, and it is therefore necessary to plan far ahead.

Stability and Emergencies

If firms are to meet successfully labor's demands for a guaranteed annual wage, they must plan for increased stability in sales and production. Interruptions in mass production have always been costly. Guaranteed annual wages or supplementary unemployment benefits are simply additional factors that make irregular operations costly.

In planning, the manager must pay constant attention to the posibility of emergencies. In a dynamic economy there is always the posibility of sudden change. Sharp increases in demand may result from war or from sudden shifts in consumer preferences.

Managers must also be prepared for sudden decreases in demand which may result from economic readjustments or competitive conditions. Extra sales effort that may be desperately needed during such an emergency cannot be organized overnight. The new products needed to stimulate sales must be ready when sales start to decline. A company whose management skills include dynamic planning will be more likely to be ready for emergencies of all kinds.

A Program of Action

Decisions on important matters must be made as they arise; the majority of them cannot be postponed without jeopardizing the welfare of the company. If a firm is to grow, expenditures for new plant and equipment must be made in spite of possible losses due to obsolescence or decline in demand; sales effort must be expanded in the face of shifts in population, changing consumer tastes, and competitors' price changes; and research on new products and processes must be carried out without assurance that it will be fruitful or that the company will obtain the desired result before competitors do.

Let us now consider some of the requirements for sound management action under changing conditions. First, management must develop better techniques for recognizing important changes affecting its business. In a free economy the majority of firms are striving for an increased share of the market. This means that many firms are contributing to the process of economic change by looking for new ways to satisfy consumer wants and by producing and merchandising new products. It is one of management's major responsibilities to be aware of such changes.

Having discerned as well as possible the direction of change, management must then adapt soundly and swiftly to such change. Changing conditions necessitate revision of present plans and policies and creation of new ones to meet the new problems effectively. Even though management is aware of basic trends and changes in the economy, failure to adapt company plans and actions to these new conditions may result first in loss of competitive position, and eventually in failure.

While adaptive action is important, it alone will not assure success. It is necessary for management to be creative in its planning and operating activities. Not only must a firm adapt to changes in competitors' actions and to changes in the economic weather, but it must create new products and services, new customers, and better management methods in order to survive.

Efficiency in All Functions

Successful operation in a dynamic economy depends, finally, on management's ability to visualize the business as a whole and to manage the entire operation as an integrated unit. Each function of the business is dependent on the others, and changes in any one part affect all the others. It is not enough for management to be excellent in one or two areas of the business. If one part of the business becomes inefficient, the entire organization is in danger of failure. All functions must be kept efficient.

There have been many examples of firms

which, despite excellence in some phases of management, have suffered competitively due to poor performance in other areas of the business. The classic example is the Ford Motor Company which in the late 1920's was outstanding in its manufacturing skill, but failed to recognize the importance of design and sales appeal. Consumer preferences were not given sufficient weight. The result for Ford was loss of industry leadership to General Motors. Such instances will multiply as the pace of change accelerates.

The Caliber of Management

It must be apparent from what we have already said that a company's greatest resource for survival and growth in a changing world is its management personnel. Most of the resources which a company needs to carry on its operations are available to all in the open market. Buildings, machines, and materials are available to all who have the necessary cash or credit. This is not true to the same extent of management men. A smoothly functioning management team cannot be purchased at any price. It is a resource which must be developed over a period of years. Once developed, however, a good management group will contribute more than anything else toward a company's success in a changing world.

Because the future survival and growth of a company will depend upon its leadership in the future, today's managers can contribute most to the long-run success of their companies by developing the men who will manage their companies in the future. The best corporate managers of today cannot accurately foresee the problems of tomorrow. The decisions of today will have to be discarded or modified to permit successful operation in the world of tomorrow. The future success of a company will depend upon having men at the top who can make wise decisions.

Summary

Ordinarily when we refer to good management we mean doing today's jobs better: better selling today; better production efficiency today; better product development today. For most firms, doing today's jobs better is a great challenge and a source of profit. Managing for today is a great challenge, but there is even greater challenge in managing for tomorrow.

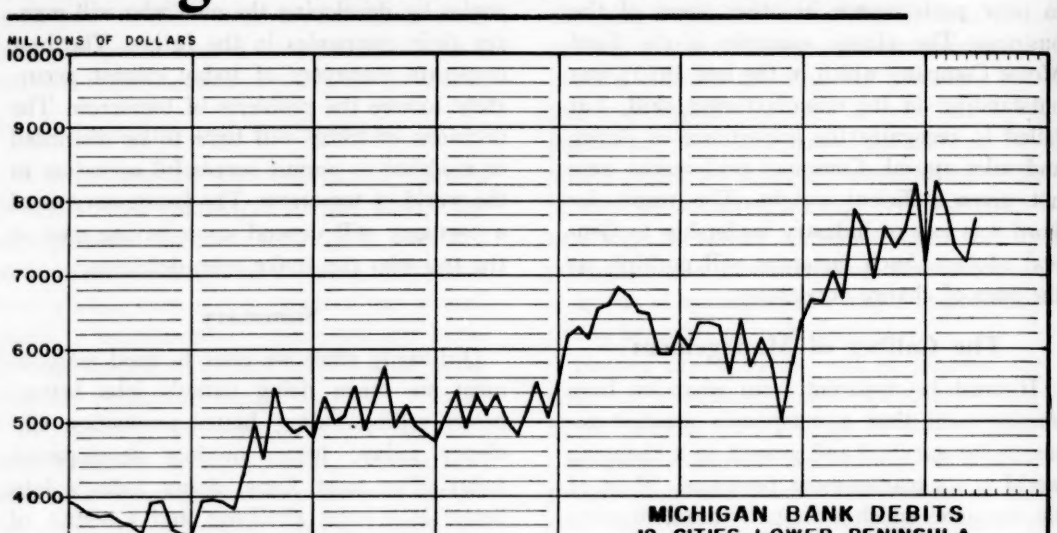
As the pace of change increases, some qualities will be at a premium. *Creativity* will be a prerequisite to successful operation in the years ahead. Since tomorrow will be different from today, there will be a high place for *foresight*. And finally, since no one can shape the future or foresee it completely, there is need for *flexibility* to meet the future no matter what it may bring. Managing for tomorrow will require managers who possess the qualities of creativity, foresight, and flexibility.

MERGERS; OR BUSINESS CONSOLIDATIONS

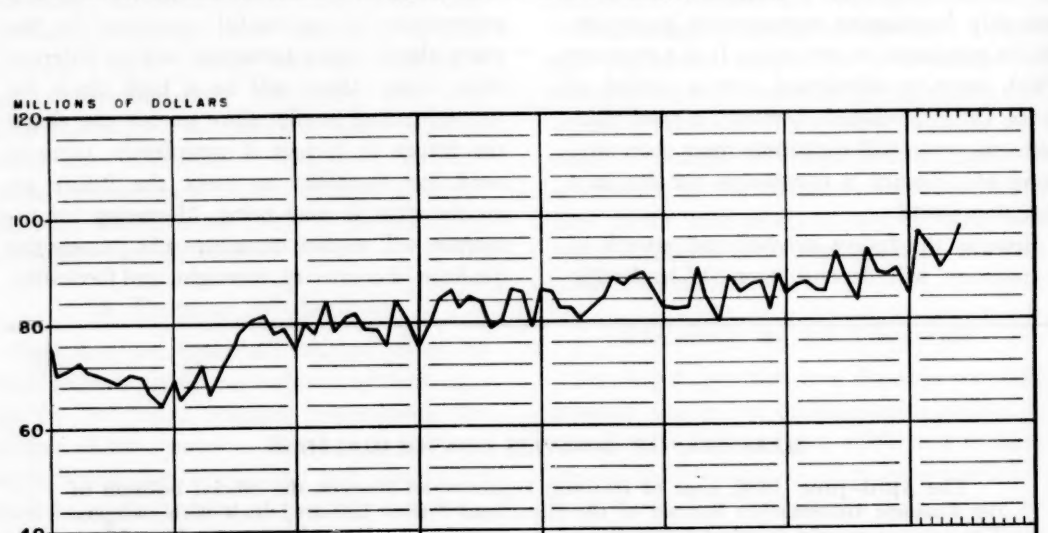
The April–June, 1956, issue of *Business Information Sources*, the official bulletin of the Business Information Bureau of the Cleveland Public Library, deals with mergers. The current merger trend and discussion have stimulated a lively interest in this subject. A selection of books, monographs, surveys, reports, symposiums, hearings, periodical articles, and business services helpful to the businessman, and of interest also to others, is listed in this issue.

Copies of the bulletin are available from the Business Information Bureau, Cleveland Public Library, 325 Superior Avenue, Cleveland 14, Ohio, for a mailing and handling charge of 25c.

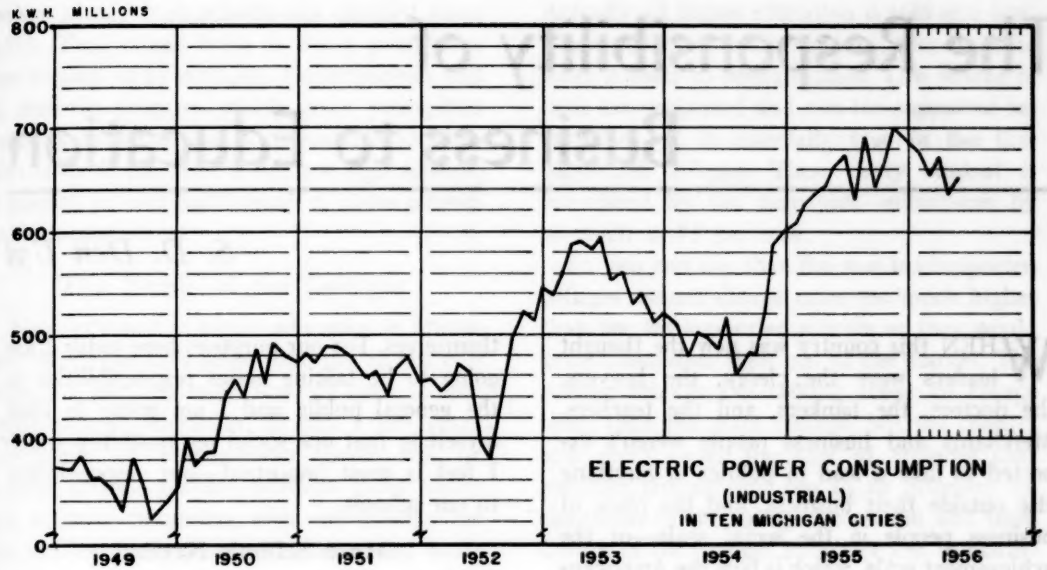
Michigan Business Indicators



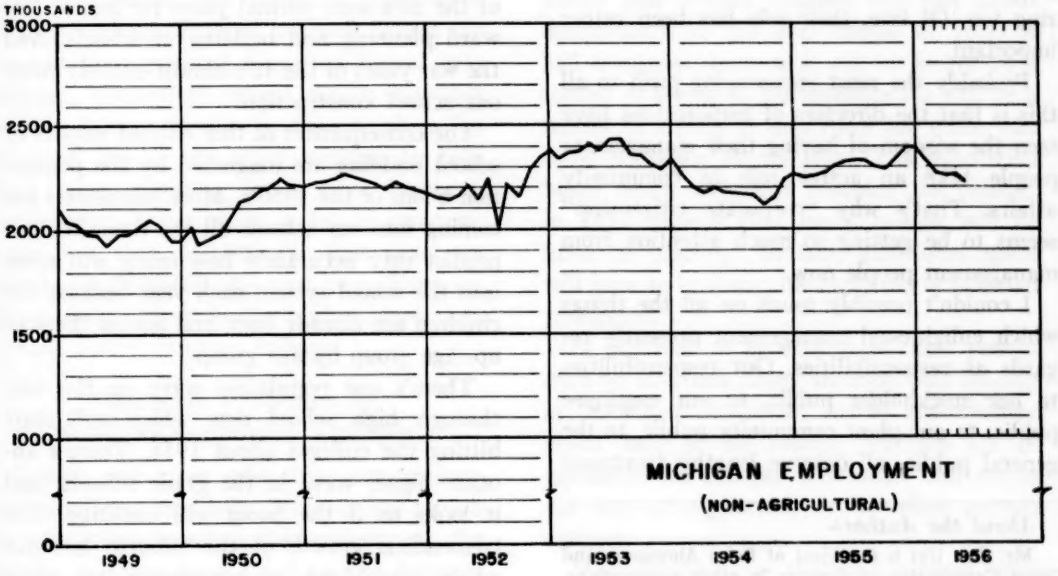
BANK DEBITS—THE MOST ALL INCLUSIVE MEASURE OF BUSINESS ACTIVITY—Lower Peninsula continued to decline in April, but recovered sharply in May.



UPPER PENINSULAR BANK DEBITS—Upper Peninsula bank debits rose in April, and reached a record high in May, following the sharp declines in February and March.



POWER CONSUMPTION—Industrial power consumption dropped in April, and rose slightly in May.



MICHIGAN EMPLOYMENT—Total employment held steady in April, and declined slightly in May—as automobile cutbacks were partially offset by increases in other areas of employment.

|| *A thoughtful business man talks about . . . . .*

The Responsibility of Business to Education

S. D. Den Uyl

WHEN this country was new the thought leaders were the clergy, the lawyers, the doctors, the bankers, and the teachers. Merchants and business people weren't expected to take a lead in politics or anything else outside their business, and the place of business people in the social scale—or the achievement scale, which is how the Americans have always measured success—was somewhat beneath these other professions.

Professional people are still regarded as thought leaders in any society, but business people have been allowed to climb in that ring too. Of late, their role has been rather important.

Probably the most encouraging push to all this is that the directors of corporations have seen the wisdom of having their management people take an active role in community affairs. That's why "corporate citizenship" seems to be getting so much attention from management people now.

I couldn't possibly touch on all the things which enlightened management presently regards as responsibilities. Our responsibilities to our stockholder public, to our employee public, to our plant community public, to the general public, all deserve lengthy treatment themselves. For our purposes here today I am going to be talking about responsibilities to the general public and I am going to limit myself to that one social responsibility which I feel is most important—our responsibility to our schools.

More Schools Needed

Here are some of the areas of education I'm concerned about. Let's look first at the problem of school buildings—public schools from kindergarten through high school.

No one could say that the depression years of the 30's were normal years for logical forward planning and building of schools. And the war years of the 40's almost entirely ruled out school construction.

The consequences of this 20-year neglect of school building are magnified by the population boom of the 1950's. More youngsters are coming into our schools all the time. We can predict very accurately how many will come into the school system each year because the children are already born and are on the way up, age group by age group.

There's one population wave on the way through high school now which will start hitting the colleges about 1958. There's another bigger wave in the grade schools, and it looks as if the boom will continue. The tremendous growth of the suburbs has put whole school-loads of youngsters into areas where last year or the year before there were no schools. This is the kind of problem that cannot be ignored.

About the Author—

Mr. Den Uyl is President of Bohn Aluminum and Brass Corporation, a director in other corporations, and President of the Michigan Colleges Foundation.

This article is adapted from an address delivered by Mr. Den Uyl at the 26th Alumni Conference of the University of Michigan School of Business Administration, in Ann Arbor, May 18, 1956.

The next building need will be for high schools. Not only are there more youngsters of high school age now, but also the holding power of our high schools has doubled since 1930. That means twice as many youngsters are staying on to graduate. Good teachers and a realistic program which gives youngsters training they can use is responsible for this. But clear as the need is for new high schools, I predict we will build many of these schools in the wrong places.

The Needs of the Colleges

Now let's look at higher education in Michigan. Management's responsibilities to our colleges are perhaps more obvious than to any other area of education. In just a few years practically all management people will be college trained people—business firms today are actually competing with one another for the graduates of schools. Engineers and Business Administration graduates are in especially short supply. It would be foolish indeed for any businessman today to insist that his business has no interest in the colleges of this state.

In my opinion, the group of colleges in Michigan whose problems are most urgent are the non-tax-supported four-year liberal arts colleges. You might expect me to say this because I have been very close to them for the past five or six years working to help them raise operating funds from business. Incidentally, we've made a lot of progress. From less than $10,000 the first year, we raised over $300,000 this past year. Even so, this is only a drop in the bucket when it is divided among fourteen colleges.

Financial Problems of Non-Tax-Supported Colleges

I think you know why these non-tax-supported colleges need help. Inflation has shrunk the purchasing power of their endowment, the income tax laws have dried up the fortunes which once helped them, and the cost of goods and services has advanced.

Some people say, "Why don't these private colleges be realistic and raise their tuition rates?" Such people do not understand the way all colleges in the country operate. Actually all higher education is sold at a loss. The students' tuitions and fees never do cover what it costs to educate them. This is true in both tax-supported and non-tax-supported institutions. It is especially true in the tax-supported colleges. There every student is subsidized by the taxpayers—sometimes by as much as 75 per cent.

So you can see that the non-tax-supported colleges cannot charge rates too much higher than the tax-supported schools or they would price themselves right out of the market. The private schools I'm talking about do charge more than the state schools, but the charges still don't cover the cost of training that student. His subsidy has to be provided by donations to the college by alumni and from friends of the college. This isn't just in Michigan—it's true all over the country.

The Coming Wave of College Students

One thing I should stress is that the competition for students which once existed between public and private colleges has just about disappeared. In the next couple of years it will disappear, because it will no longer be a matter of trying to get students—it will be a matter of trying to find room for those who come pounding on the door. The population boom which will start reaching the colleges in 1958 assures that every college will be filled to capacity. In fact, additional space will have to be found for hundreds of talented youngsters.

In our rush to accommodate these youngsters we may risk losing an important balance in Michigan education. Across the country about half of all college students are in tax-supported colleges. The other half are in the non-tax-supported, or so-called private colleges.

Most people agree that this balance helps to assure the freedom of both systems. In Michigan for years we have had a higher proportion of our students attending the state

schools. I see nothing wrong in that, providing each system continues to take its share of the student load. Recently that has not been the case. Where the state colleges expanded rapidly after the war with capital building programs, the private colleges' expansion by comparison was small.

The private colleges have been so busy trying to raise operating funds that few of them have been able to secure capital financing in any measure comparable to the state institutions. The ratio currently is 82 per cent of our students in state colleges and 18 per cent of our students in private colleges. I see no immediate slowing of this trend.

I'm proud of both systems, public and private: My children have attended both systems. But I'm worried now because I think if we go too far we may lose the balancing effect which one system has on the other. Much of the academic freedom which our state institutions enjoy depends on at least the existence of competing private institutions.

Let me hasten to point out that I am not saying that what our state schools teach is influenced by their being under state control; but I think you will agree that if every college in Michigan were dependent on the legislature for money to operate, then at least the avenue for government interference would be there.

For the good of the state schools as well as the private schools, I think it is part of my obligation and yours to help the private schools absorb their share of the student load.

Well, what's to be done about it? Stop the state schools from building for a while? Certainly not. They will have to go some as it is to catch up with the population boom on its way. The fault lies with the private institutions themselves. They simply haven't expanded fast enough to accept their share of students.

Should we help them with government financing? Certainly not. But as business people and as citizens I think we should see that they have every opportunity to raise the funds they need and to help them raise the funds. If our personal loyalties as alumni of other schools lie elsewhere, then we can at least influence the giving policies of our companies to assist these schools.

Helping Qualified Students

There is another concern for education that I would like to mention—one more area that I believe we as businessmen have a social responsibility to do something about. It is simply this. The upper quarter of our high school graduating classes are the ones regarded by educators as college material. Presently only half of these youngsters do go on to college. This is a great waste of talent.

If we feel strongly enough about the value to business of having college-trained people; that is, if we feel strongly enough that we are willing to help pay for the education of anyone who does go on to college; then we have an obligation to take an interest in seeing that the most talented of our youngsters do have a chance to go to college. Notice that I said, "a chance to go." No one could ever make me buy a program which would, in effect, *push* youngsters into college. That goes, too, for automatically qualifying for a free education because of a high I.Q.

The chance to go to college, I believe, should involve some effort—some sacrifice—on the part of the youngster himself. And I don't think just studying is enough of a sacrifice. It's an old saw that people appreciate more the things they work for than those they are handed—but it's true. And appreciation of an education enhances the opportunities for putting it to good use.

The World Struggle for Men's Minds

Our attitude in seeing that the best youngsters have a chance at college and in seeing that college means the quality of training that it is supposed to mean should stem from us as alumni interested in our college.

If that doesn't move you, I would say we as citizens and business leaders have a social obligation in this regard.

If you're still unimpressed let me put it

this way: There are only two major forces in the world today—the Communist field of influence, and the free world. The difference between these forces runs deep into man's philosophical beginnings. The contest between these forces, whether it breaks out from time to time into actual war or merely continues as armed truce, will largely be a struggle for men's minds. In such a contest no measure of a nation's natural resources, miles of coastline or productive capacity, is as important as a comparison of the trained minds of these opposing forces. That alone—as a last resort—should make any thinking American concerned for our system of higher education.

I've been told that the Russians are graduating 60,000 engineers yearly to our 23,000. Even if the caliber of their trainees is as high as they say it is—and I doubt it because of their machine-like, egg-grading method of selection; and even if their technology is as advanced as they say it is, I am confident that their educational system cannot bring out latent talent as well as our system.

The difference I'm banking on is the free mind. I don't think you can channel people to genius—it has to be partly inspired. Our system of education encourages youngsters to analyze what they are being taught to see if they can come up with a better way. There is no penalty if a student questions the validity of principles he is being taught—in fact, I think most professors are quite delighted to encounter a questioning mind because it usually denotes a thinking mind.

True Patriotism

There is a growing tendency among our young people to be too sophisticated for flag waving. Being intensely patriotic nowadays might be regarded in some quarters as being just a little corny. I think it's fine that the American people are no longer so naive that they will swallow anything a politician says about mother, home, and country; but I think a sophistication which de-emphasizes patriotism and all it stands for—love of country and the rights and privileges we enjoy as Americans—is more than a little bit dangerous.

I think our country is a whole lot more apt to fall victim to Communism or any of the other "isms" through moral decay of our people than through conquest. That is why I believe it is so important that all of our citizens undertsand thoroughly what their rights are and what it takes to preserve them.

Preserving Our Cultural Heritage

To those of us who are privileged with more than a high school education, our responsibilities to the educational system in this state are more exacting.

What we are striving for educationally is more than simply a race with Russia to see who can graduate the greatest number of engineers or business administration students. In a sense we are the custodians of Western civilization. Western Europe has been the fountain of the world's culture for two thousand years, but the ravages of war are telling. The advance of higher education is hampered by war and political strife—half-full stomachs and political pressures have a way of minimizing the importance of learning.

The burden of preserving and advancing the cultural heritage of the whole Western world is more ours than we realize. A brilliant pace of scientific advance will not compensate for a decline in the humanities—indeed, if we discover weapons powerful enough to destroy a continent with the push of a button, we're going to need all that the humanities—philosophy, logic, yes, and poetry, too—can teach us, not to push that button.

We, as alumni of our colleges and as businessmen, have a social responsibility which embraces our total educational system. Certainly we have an obligation to our own college—an obligation that is really a privilege to support with our words and our dollars. But the responsibility concerns more than loyalty to one's school. It is a responsibility to all education—all learning—and learning is the finest jewel of Western civilization.

A new study of key measures that shed light on whether stocks are high or low.

Stock Market Thermometers

Robert W. Storer

THERE are many stock price "averages" which tell us how "high" the price is of a given composite of stocks, in terms of a mean price per share, or as an index number, relative to the average price during a base period.

Such stock price indexes are valuable, but they're not enough. Each one tells us the height of its particular cross-section of the stock market, but only by comparison with its own historical levels, or the record of other stock price indexes. Both of these kinds of comparison provide more statistics than they do knowledge, insight, or, especially, *foresight*. Long term growth, commodity price inflation, and many other factors vitiate the usefulness of the "averages" having only the simple comparison with their own past.

What is needed is a set of stock market *thermometers*, which will tell us how high the particular sample of stock prices is, not with reference to its own past, but rather with reference to the prevailing levels of those economic facts and quantities which endow stocks with value and tend to mark the market's measure of that value.

Stocks in going concerns possess a value and a market price only because of present or expected *earnings*. These earnings are a prerequisite for *dividends*. Both are influenced in a complex fashion by changes in the level of *commodity prices*. The rate at which the market *capitalizes* both earnings and dividends will vary, among other things, with the *yields* obtainable on alternative investments, such as, for example, on high grade bonds. Some insight into the degree of optimism being exhibited by the market can be gained by a comparison of the price levels of *speculative stocks* with those of *high-grade investment stocks*.

Thermometers and Barometers

A stock-price index thus will be really "high" or "low" only in terms of such value determinants as the above, which may properly be called "thermometers." But these "thermometers" must be *calibrated* by relating the *present* levels to the varying *historical* levels over as long a time as possible. If we then compare the record of stock prices with the simultaneous behavior and levels of one or more "thermometers," we have some idea of the conditions under which the stock price index has typically in the past made a major turn down or up.

For example, analysis reveals that when, over an adequately long period of years in the past, the dividend yield on one particular sample of stocks remained lower than about 3½ per cent, the stock price index was considerably more likely to decline thereafter than to rise. The converse was true when the yield remained for some time above about 6½ per cent. Yields, then, are a useful *thermometer* of stock prices. They can also be used as a *barometer* to *forecast* stock prices on the same basis that if the temperature in a locality remains far enough above its normal

About the Author—

Mr. Storer is Vice President of The Manufacturers National Bank of Detroit. Since graduation from Harvard University (A.B., 1925; M.B.A., 1927) he has had a varied career in advanced study, investment and commercial banking, mutual funds, and fire, casualty, and life insurance.

for the season, the likelihood that it will decline, rather than remain steady or rise further, will become greater at a rate and to an extent to which analysis of the historical data can give some clues.

Seven Thermometers

No single thermometer, such as stock yields, is, by itself, adequate as pointing to probable future action by stock prices. Earnings and dividends can decline to almost nothing, as they did in 1932–33, thus distorting the thermometer reading and misleading the reader. Moreover, the pace at which our economy has evolved over the past quarter-century has undoubtedly altered many of the economic relationships upon which the interpretation and value of such thermometers depend.

In order to allow for such economic distortions and changes in relationships, the writer used seven thermometers, selected empirically, on their record of having had pronounced peaks and valleys at about the same time as the stock-price index, and of having displayed no significant drift or trend.

The stock-price index is the Standard & Poor's daily average of 50 industrial stocks, available with related statistics of earnings, dividends, yields, and price-earnings ratios, back to 1926. Prices at the end of each month have been used. These seven thermometers are briefly described below. Several of them are quite familiar and widely used. Whatever innovation is involved in the writer's use of them consists primarily in the statistical treatment, involving the historical relating of them in various ways to the major cyclical peaks and valleys of the stock market, as measured by the stock price index. The degree of confirmation afforded by multiple sell or buy indications also adds to the dependability of the results.

I. *Yardstick I.*

This is a ratio between actual stock prices (as measured by the index) and a "fair" value of stocks. The latter is the result of multiplying together three factors: (a) Normal dollars-per-share earnings on the stocks in the index, as read off a long-term trend line arrived at after correcting for commodity price inflation, (b) the current level of wholesale commodity prices, and (c) a long-term average ratio of price-to-earnings of 12.88.

II. *Yardstick II.*

This is another ratio between actual and "fair" stock prices. It utilizes the observed tendency for the price-to-earnings ratios on the stock index to move inversely to the rate of earnings on the book value or net asset value of the stocks. By computing the long-term average product of the price-to-earnings ratio and the simultaneous rate being earned on book value, a "fair" price-to-earnings ratio, appropriate to each level of earnings, can be derived. The ratio of the actual to the fair price-to-earnings ratio is the same as the ratio of actual to fair stock *prices*.

III. *Price to Earnings Ratio* (actual)

The conventional simple ratio of actual stock prices to the most recent twelve months earnings is a useful thermometer.

IV. *Stock Yield* (in per cent)

Alone among the seven thermometers, this widely used basis of comparison goes *lower* the *higher stocks* are. As used in this work, it is the aggregate of the cash dividends paid on the stocks in the index during the most recent twelve month period, divided by the aggregate market value of the stock at the end of the period. Yields are a basic yardstick of the current income return on the investment. Even by itself, without relation to alternative sources of income, it has usefully marked past periods of over-optimism and over-pessimism.

V. *Ratio of Bond Yield to Stock Yield*

This is a variant on the above simple stock yield, obtained by dividing the yield on Standard & Poor's A1+ corporate bonds by the stock yield (IV) mentioned above. The closer stock yields approach to yields on prime

quality bonds, the more competitively attractive the bonds are, in income return.

VI. *Ratio of Low-Priced to High-Grade Common Stocks*

This is the ratio between two of the Standard & Poor's stock-price sub-indexes, one of 23 low-priced stocks and the other of 13 high-grade issues. In past periods of business and speculative optimism the former has tended to outrun the latter, for various reasons. The converse has also prevailed during depressions.

VII. *Market Price to Book Value Ratio*

Over the years, most companies will reinvest substantial amounts of retained net earnings and thus add to their earnings and dividends as well as the net asset value ("book value") of their stocks. The latter figure is a rather stable measure of economic value, above and below which the market price tends to fluctuate. (This is much more true of a large cross-section of stocks than of an individual issue.) The ratio is obtained by dividing the stock price at the close of each period by the preceding year-end book value per share of stock. The book value is a projection by the writer until the actual figure becomes available.

Combining the Thermometers

So much for the summary details of the individual stock thermometers. They are much more useful as a team than as individuals, but how can one combine in any usable form such disparate figures as a ratio of 1.60, a yield of 3.75%, and a price-earnings ratio of 13.00?

Two methods are being used: (1) We have empirically determined profitable "sell points" and "buy points" of the individual series, and the number of such indications at any given time, and (2) We employ what we call a Thermometer Control Ratio, which statistically combines the seven series of thermometers into a single composite. First, the sell and buy points:

For each of the thermometers, by inspection of the month-by-month record of it and of the stock price index, there has been determined what reading of that thermometer most often gave timely warning that the stock-price index was so far overvalued or undervalued that a major reversal in stock prices might be expected. Such levels prior to *bear* markets are *sell* points, and before *bull* markets, *buy* points. With one minor exception, the same sell point and the same buy point for each particular thermometer have been used throughout the entire 1926–56 period.

We have thus a battery of indications which can range from seven *sell* indications to seven *buy* indications. Except under extreme conditions, one or two thermometers have usually failed to give an indication, and one or more has usually been quite early. But by the time any five (or more) thermometers have given the same indication (whether buy or sell) and none of that five has canceled by giving the *opposite* indication, a major reversal in the stock price index has invariably followed in the past.

The Thermometer Control Ratio

This brings us to the second method for organizing the thermometers for effective functioning as a team—the Thermometer Control Ratio or TCR. Each of the seven statistical time series has been converted to index numbers based on its own 1926–1954 average. The seven index numbers for each month have then been averaged to give a single combined index number or TCR reading for that month. By reason of this derivation, a TCR reading of 1.00 means that the Standard & Poor's 50 Daily Industrial Stock Price Index at that time is exactly at its "fair" value, as determined (a) by current levels of earnings, dividends, book values, bond yields, commodity prices, etc., and (b) by the 1926–54 average relationships between these variables and stock prices.

For a sell-point and a buy-point on the TCR it was experimentally found that reaching a given level was not alone enough. The

empirical results would have been better if, after reaching a warning level (actually a TCR of 1.21), any excess each month over that level thereafter were accumulated until a total excess of 0.70 or more had been reached. At that point a major sell signal would be interpreted.

Similarly, the requirements for a TCR major buy signal are the reaching of a reading of 0.74 plus cumulative deficiencies below that level, of 0.35. It is interesting that historically the warning levels have involved about the same degree of over- or under-valuation of stocks, 1.21 representing 21 per cent over-valuation and 0.74 representing 26 per cent under-valuation of stocks.

The accompanying table sets forth the various buy and sell signals, both for the seven thermometers and for the TCR, together with the readings of each of them prior to major reversals in stock prices.

The Current Situation

Prior to the June, 1949 low in stock prices, all seven thermometers were giving *buy* indications on a cumulative basis, and continued to do so until July, 1954. One after another, they then reversed until by February 1955, four were in a *sell* position. The remaining three had not reversed, but they had risen out of the *buy* indication area. In showing four *sells* and three *buys* for a substantial period, the present is similar to the interval from May, 1933 to February, 1935, and from April, 1947 to January, 1949. In the present situation, a fifth sell indication will require either a considerable further advance in stock prices or else a decline in the fair value of stocks, occasioned by such developments as a fall in earnings or dividends or a further material rise in bond yields. Or some combination of higher actual and lower fair values would give one or more additional sell signals.

The TCR also has not given a major sell signal. Stocks were undervalued (the TCR was below 1.00) until as recently as September, 1954. Since then, the TCR rose at historically a rather rapid pace to the warning ratio of 1.21 in June, 1955, and subsequently to 1.28 in September, 1955. Between these two dates it was slowly accumulating an excess over 1.21. The TCR subsequently dropped to 1.17, and more recently again moved up to 1.29 at the end of April, 1956. At this monthly rate of accumulating excess (1.29–1.21 or 0.08), it would require another five months to give a major sell signal, if both actual and fair values of stocks should either remain unchanged or should maintain their April 30 percentage relationship.

Scope and Limitations of this Approach

Stock prices don't always rise or fall by reason of under- or over-valuation in the market. The buy and sell indications discussed herein would have worked quite well, viewed retrospectively, in advance of market cycles, but in addition, stock prices also experienced intermediate swings of small to moderate size, quite unheralded by the thermometers or by the TCR.

Another limitation, inherent in any systematic application of the past to anticipate the future, is that—at least in matters subject to man's control—the future is never the exact pattern of the past, but represents rather a new and unique synthesis, compounded out of economic, social, and political elements, each one perhaps qualitatively familiar but integrated into an unprecedented combination. Hence, we cannot be at all certain that the relationships which held good from 1926 to 1954 will still be valid now or in the future. This particular statistical machine has been working in forward gear, into future time, for only about 1½ years. It has met its first test by *not* giving a major sell signal, by any interpretation, up to this time. It still has ahead of it the test of calling the next major turn in industrial stock prices. Over the past thirty years, action in accordance with signals would have bettered the stock price index itself by over 40 per cent. This is encouraging, but, of course, *proves* nothing.

READINGS OF STOCK THERMOMETERS

R. W. Storer — May 2, 1956

Major Highs and Lows of Stock Prices (1) Date	Price	Yardstick Ratios (2) I	II	Price Earnings Ratio	Stock Yield %	Bond-Stock Yield Ratio (3)	Low-Priced High-Grade Common Stock Ratio (4)	Market-Price/ Book Value Ratio (5)	No. of 7 Thermometers Giving Buy or Sell Signals Prior to Turn	TCR (6) Level of Readings at Major Highs & Lows of Stock Prices	TCR at Time Buy or Sell Signal Given: Date	Reading
Buy Signal at:		.81	.73	11.00	6.60	.50	.90	1.10	b=buy	0.74+0.35 cumulative deficiency		
Sell Signal at:		1.29	1.10	17.00	3.48	.70 (.80-to 1940)	1.70	1.60	s=sell cumulative	1.21+0.70 cumulative excess		
HIGHS												
8-31-29	250.7	2.78s	2.62s	18.66s	3.26s	1.51s	1.74s	3.77s	7s	2.01s	9-30-27	1.37s
2-28-37	174.4	1.82s	1.52s	16.67s	3.77s	.85s	1.61	2.22s	6s	1.39s	7-31-36	1.29s
12-31-38	130.2	1.29s	1.11s	23.25s	3.32s	.93s	.75b	1.53s	6s	1.21	No signal given	
5-31-46	184.0	1.22	1.22s	26.02s	3.45s	.72s	2.00s	1.77s	6s	1.36s	7-31-46	1.24s
LOWS												
6-30-32	35.1	.47b	.24b	23.88s	10.15b	.54b	.63b	.36b	6b	.63b	6-30-32	.63b
3-31-38	83.6	.81b	.71b	9.35b	5.64b	.57b	.73b	1.03b	7b	.73	No signal given	
4-30-32	77.2	.61b	.63b	8.69b	8.19b	.35b	.82b	.91b	7b	.60b	12-31-41	.62b
5-31-49	138.3	.60b	.70b	5.67b	6.81b	.40b	.91	1.02b	6b	.62b	4-30-49	.65b
RECENT												
11-30-55	481.6	1.60s	1.49s	13.30	3.94	.78s	1.07	2.31s	4s	1.23	No signal given	
12-31-55	482.6	1.60s	1.47s	12.64	4.04	.78s	1.07	2.32s	4s	1.23	" " "	
1-31-56	462.7	1.51s	1.44s	12.38	4.13	.75s	1.09	2.11s	4s	1.19	" " "	
2-29-56	480.6	1.57s	1.44s	12.38	4.14	.74s	1.07	2.20s	4s	1.20	" " "	
3-31-56	515.6	1.68s	1.55s	13.28	3.85	.81s	1.04	2.36s	4s	1.28	" " "	
4-30-56	516.1	1.66s	1.60s	13.72	3.88	.84s	1.03	2.36s	4s	1.29	" " "	
										Net cumulative excess to date, 0.35 points.		

(1) Standard & Poor's 50 Industrials at close of each month. 1926=100.
(2) Yardstick I—Ratio of Actual Stock Prices to Normal, based on level of commodity prices, normal price earnings ratios and long-term earnings trend.
Yardstick II—Ratio of Actual to Normal Price-Earnings Ratios, based on S & P's Quarterly Profit Margins relative to Book Values (preceding year-end book value).
(3) Latest Weekly Index of S & P's Industrials and Composite A1+ Corporate Bonds.
(4) S & P's Latest Weekly Index of Low-Priced Common Stocks (23) to High-Grade Common Stocks (12) 1935–9=100.
(5) S & P's 50 Industrial Stock Prices to Preceding Year-End Book Value per share of stock.
(6) TCR=Thermometer Control Ratio or 7 Thermometers Combined as index number of 1926–54 average=1.00.

On a historical basis, stock price turns have in general followed 5 or more of the Thermometer Series signals, though some have started on fewer.

Data are subject to revision as later and more complete statistical figures are available.

A management expert takes a critical look at a new management tool.

Operations Research: Need for Re-evaluation

George S. Odiorne

ABOUT fifteen years have passed since operations research was developed and put into use and the name coined. It began with a study of military problems of a strategic nature and was used successfully on such important problems as bombing-target selection, convoy patterns, weapon-utilization, and similar vital decisions. It was seldom if ever employed at the tactical level by subordinate field commanders, except indirectly through carrying out strategic decisions implemented on a grander scale at a higher level.

In the fifteen years which have followed, operations research has gathered many devotees who have sought means of applying and extending its methods to industrial management decision making. Three major trends have comprised its development. First, it has gone far in adding advanced mathematical techniques to the tools used. Beyond this it has attempted to apply mathematical methods not only to strategic decision making in business, but also to tactical areas. Finally, it has bounded with great enthusiasm into the field of general management theory and group relations.

About the Author—

Analyst, writer, teacher, and business man, Mr. Odiorne is Director of the Intra-Company Management Program of the American Management Association. Since graduation from Rutgers and New York University, he has been a manufacturing production manager, developer of management programs, and has written some 40 articles for professional journals.

It is the thesis of this article that OR has made great forward steps in the first of these three areas. In the second, it is suggested that its value is yet to be proved. In the third area, it is proposed here that the OR proponents have exceeded themselves and are on most untenable grounds. Let's look at each of these developments in operations research, and appraise how well these methods have worked themselves out, and what the implications are for management theory and practice.

Mathematical Programming

Four principal techniques have been successfully applied under the heading of operations research in the transplantation of the methodology from military to managerial decision making. The first of these is *linear programming*. Here the models which Leontieff used in economics to describe input-output relations have been refined and extended to a multiplicity of specific strategic situations such as transportation, warehousing, inventory control, and product mix.

The second is *game theory* wherein the mathematical techniques of Morgenstern and Von Neuman for finding the best or optimum combination of highly variable factors can be arrived at in rational fashion.

The third technique is that of *sampling theory* which has been known to statisticians and mathematicians dating back to Leibniz,

but which came into widespread use through the work of Doctor Walter Shewhart of Bell Telephone Laboratories before World War II.

Fourth is the use of *probability models* for a multitude of such problems as estimating machine breakdown, and other prediction problems. The probability theory underlying much of it dates back over a century at least, with at least one monograph on Port Royal Logic being written in quite modern fashion about probability in 1662.

The contribution of the OR experts of the decade since the end of World War II is mainly in finding new and highly ingenious applications for these techniques in managerial decision making.

Among the subjects which have been dealt with by OR techniques are such managerial problems as transportation networks, market analysis, inventory control, warehouse location, plant-site determination, machine loading, production scheduling, cost analysis, machine replacement, allocation of capital, and a host of other important managerial problems.

Status Problems

At least two professional societies aimed at promulgating OR have been established, and other management and engineering societies have given some serious attention to educational programs in it. In this first aspect of OR, it is the mathematician whose prestige is greatest, and who in fact makes the indispensable contribution and comprises the elite. At the center of the inner circle of OR are the amazing few who not only know the necessary calculus and statistics, but carry it with easy familiarity onto the plant floor.

While the mathematical procedure attracts the attention of a few genuine scientists, most OR men are hybrids of the theoretical and practical arts of designing mathematical models and running a business. This leads some people to misconstrue what an OR man actually is. To the shop man he may appear to be a long-haired mathematical wizard who wafts about the plant performing mystical rites involving higher mathematics. To the pure mathematician he seems to be a watered down version of a real scientist who probably washed out of the big leagues of higher mathematical theory, and works in the intellectual boon-docks of applied math.

As a result of this finely balanced position, the OR man himself is frequently uncertain of his status and function and seeks security by identifying his normative position as "reporting to the top-executive level of management."

These status problems have some significance for the future of OR, for they bear directly upon the caliber of scientist who will pay serious attention to mathematical programming techniques upon which OR must ultimately stand or fall. If the scientific respectability of OR declines below the point where no serious mathematician would trifle with it, the future potentials of OR may never be realized. To the scholar or scientist it is more important that OR is a respected field of scientific effort than the fact that OR is a private entrance to Executive Suite. Since these scholars provide the basic materials and research labor for the OR mill, their sustained interest and effort in technical methods is imperative.

Operations Research for Strategic Decisions

With a more than adequate kit of techniques at its command, OR requires that problems be fed it in order to demonstrate its mettle. The experience of the mathematical economists and econometricians provides little by way of example to which OR people can point with pride when selling their wares to management. As one proponent expressed it, "A certain amount of blind faith" in the usefulness of OR is required by a manager who intends to employ it for assistance in decision making.

Since strategic decisions are most often made by executives of a corporate trustee level, it is understandable that OR's growth rate has not been faster. Such men are unaccustomed to using unproven methods. Then

too, as a message OR is often couched in language which is not translated easily into the terms nor context which might make it palatable to a major executive.

As a management technique, OR in its mathematical programming aspects has suffered grievously in terms of misunderstanding due to the internecine warfare of its experts over definition of its scope. Statistical quality control for example is considered by its adherents to include all aspects of mathematical programming, and a study of the talks presented at the past three national conventions of the American Society for Quality Control reveals numerous papers on such topics as "Decision Making," Market Research, Machine Utilization, and Design of Experiments. Likewise, meetings of the Operations Research Association, American Statistical Association, and other august and learned groups have been replete with papers oriented toward managerial decision making in theory and in application.

In the Organization Chart

A paradox which confronts OR is the relative level at which its practitioners must come to rest in the organization chart. Most case histories plus vociferous statements by its proponents extoll its uses for grand strategy decisions. Yet, the best technicians most generally come from the staff of the plant engineer, considerably lower in the hierarchy than is customarily consulted in shaping top-management decision making, and especially in such a fundamental way as prescribed by the techniques of OR.

There is little comfort for the future prospects of OR in this regard, considering the great number of specialized staffs which are currently competing for the already overcrowded pipeline to the top-executive ear. Organization planners, control staffs, public relations managers, plus the normal complement of functional staff and line officers are vying for more time in the inner office now. Yet, unless OR staff gets this attention its usefulness in strategic decision making will be impossible of fulfillment. It must then either settle down quietly to work through one or more layers to the top; or must concentrate upon doing its good work at a tactical decision-making level. While this is a possible area for fruitful work, it too presents some difficulties.

Operations Research for Tactical Decisions

Students of management are in quite general agreement that managerial decision making will be more precise at the strategic level through the use of mathematical programming and OR. Yet OR scientists have not stopped here but have forged into more specific nuts-and-bolts problems of industrial operations such as helping foreman Jones determine his machine loads and analysis of operator efficiency between day and night shift.

There is little doubt that this is possible for a programmer, but the question arises as to whether or not this is a legitimate and economic field of activity for the tool, or whether or not it should extend itself below generalized or theoretical levels of decision making. There are many instances where this "push-down" has been tried and failed, and with sufficient frequency to suggest that its value in this area of doing business is yet to be proved.

The question is not whether operations researchers should go out into the shop to perform their studies, for they obviously must study operations when and where they take place. The key distinction comes in the answer to the question:

"Why are they studying an operation in the plant?"

If OR teams are studying operations of a fork lift truck or assembly line simply to improve performance on that crew or that line alone and no other, they are working on tactical problems. If they are collecting data on these operations as a basis for a general policy or procedure decision affecting a wide range of similar activities, their concern is strategic.

This distinction is often missed in the frenzied hunt for opportunities to use OR on something—*anything!* As a result, highly trained talent is sometimes employed to solve trivial problems, or developing answers not suitable to wider application. Using the artillery of OR to bag a mouse has three results. There is a general loss of confidence in the efficiency of the weapon; the cost of exterminating rodents rises to uneconomic levels, and the percentage of mice killed per salvo goes down.

Reactions to Operations Research

Overselling operations research as a tactical tool ultimately weakens its employment possibilities. The over extension of statistical quality control through overselling is a case in point. Despite the excellent results to be had from control charts, the instances where over extension of the charting technique has caused a general loss of confidence in the method are common enough to provide material for doubters of its suitability as a tactical tool in the plant.

Experience of the writer with foreman training in statistical quality control in New Jersey factories indicated several basic principles which limit the application of this particular mathematical tool in control of minor details of manufacture. The first is the allergy which most foremen have to mathematics beyond simple arithmetic, even when they have been college trained in math beyond algebra. In its present state of technology, the business is managed at the plant level by an operating supervisor who has a block to calculation which involves anything as complicated as taking a square root.

The use of game theory or linear programming in tactical decision making by management at the department level where so many important decisions must be made must await the day when all foremen or low level planners have a grasp of and liking for a more advanced level of mathematics than presently characterizes them. The addition of staff experts to help foreman or general foreman to perform his mathematical calculations, as is suggested by some, is sufficiently uneconomic as to be unforeseeable in the future.

While future events may provide the key to this and other blocks to extending OR to tactical decision making, it is more realistic to assume that the greatest gains for OR in managerial decision making will be at the strategic level. Here, the results of mathematical programming, the design of scientific but simply executed sampling plans for inspection and procedures for production planning can exert a potent influence over the tactical conduct of the business without expecting that every decision in running the plant must be based upon quantitatively developed methods.

The Philosophy of Operations Research

In consideration of OR as a theory of management, we move out of the field of mathematics and mathematical programming. For despite the mathematical accoutrements with which it surrounds itself, OR is a logical system which has certain heuristic principles, fundamental hypotheses, definitional assumptions, and useful fictions upon which it devises its decision-making actions.

The best insights into these hypotheses are found first in its theories of group behavior and secondly in the methods which it adopts in selling mathematical programming as a tool of managerial decision making. There is in both a strong resemblance to a Veblenian dialectic. Despite the fact that the procedures of OR are incomprehensible to all but a corporal's guard, the philosophy itself is quite understandable and is, in fact, the important aspect of operations research to management and to society.

As we put aside the present vague, intuitive, inductive, and highly personalized methods of decision-making in management in favor of OR techniques, we must track down the possible consequences of this new system of power, and foresee some of the results of carrying out the philosophies proposed by the new decision makers.

Great emphasis is placed upon the mathematical programming method as a *tool* of management. Tacitly implied in the array of papers presented is an underlying assumption that mathematical programming *is* management theory. This theory is vigorously merchandised by a technique which can best be described as "obtaining the King's ear." A typical approach here:

> "Opportunity is the life blood of every OR effort today. If there is opportunity, then select one or more persons from your company to form the nucleus . . . be sure your consultants really train; and by training, I mean the activity of instilling enough information so that the person in charge knows when and where to go for help . . . then perhaps for the first time management men can begin to understand what rational behavior really means."

A Proposed New Method of Management

The implication here is clear. What we are dealing with is not a tool of management; but a proposed new method of management. It implies that the manager of the future must be equipped to make decisions based upon mathematical programming of data and quantitative fact. While today's archaic manager can get along by giving his ear to the OR programmer, the manager of the future must himself be nothing less than a master programmer who manages a corps of subordinate programmers. It implies, as Drucker has said, that "the days of the intuitive manager are numbered," and every opportunity to hasten his departure is a boon to OR.

These are serious implications, and require that we look again at both the methodology, and the basic philosophy of management, of the OR technicians who are doing most to develop these methods, and to install them by frank opportunism. If we accept these masters of mathematical programming as designers of our decisions, we invest them with enormous power, not only within the company which employs them, but within society itself.

The most important fact about the new decision making is that it reduces complex variables into quantitative terms, expressing possibilities in terms of the simple, clear, and precise techniques of mathematics. The essential newness here is not the method of converting highly complex decisions into numerical form, but the principle of managerial decision making which emerges.

It replaces the management principle which is induced from case studies, experience, and the recital anecdote of experienced Old Hands, with a deductive method of simplicity and precision in the face of uncertainty. In the place of hunch and intuitive guess, the executive consults a probable chain of events, on which the chances of an event are expressed in a range of probability. It replaces inductive logic, or inductive probability with deductive probability.

Expressing it another way, it replaces management by principles as developed in law, economics, or the social sciences with management by principles as developed in mathematics and science. This is not to say deduction is bad. It is merely suggested that managers should be fully cognizant of the significance and nature of this change before plunging wholeheartedly into this new theory of decision making, or abdicating control to the new elite.

Assumptions of the New Decision Makers

The new decision makers proceed on certain basic assumptions which one should understand from the beginning. In general, they are economic hedonists. They assume that all significant facts are subject to quantification. They assume that every decision will be judged by the value-standard of price, and that price is equivalent to value. This in itself leads to some circularity in reasoning. Furthermore, their price calculus is almost universally couched in the terms of accounting assumptions. Their study of interpersonal relationships within a social group is confined to small group relations. In 1953 C. West Churchman defined operations research as:

> "That branch of social science in which one is concerned with measures and methods of effective decisions in social groups. In other words, operations research is the study of group behavior from

the viewpoint of the quality of the behavior: the quality of the behavior refers to the effectiveness of decisions relative to a set of objectives."

It is obvious that OR is not simply a technique for descriptive analysis of the decisions of groups, but rather a new philosophy for making decisions with procedures to match. This being the case we must logically ask upon what basis goodness or badness of the decision is chosen by the mathematician? We must further ask if the standards for managerial decisions are properly set by those who are simply masters of measurement techniques?

If the acceptance of positive standards is part of the package which we must buy in order to utilize the measurement methods, we can rightly ask outselves if it isn't time to reassess the position of OR as a science, with the possible view of reducing it to its logical position as a functional programmer rather than a shaper of management principle?

In 1921 Thorstein Veblen in *The Engineer and The Price System* suggested a new management principle under which the "tough neutral technician" would assume control of the economy for the purpose of unleashing the productive power of technology for use. Although the goals of the OR technician are less clear than those of the Veblenian "soviet of engineers," there are sufficient likenesses in result to suggest that we might wish to reconsider what would seem to be a "soviet of mathematicians" or at least to investigate and define more fully what manner of business system we might have under the system resulting from full development of the policies of the new decision maker.

It might well be that, having all of the facts, we would decide to adopt the advice of the Greeks and be ruled by philosophers. Or perhaps we might go to the philosophy department and ask for some assistance in improving our decisions through better application of inductive, non-mathematical logic which would bring the experience of our skilled executives in fuller use. Here we might obtain some help in the prediction of success of propositions rather than events. In management there is some doubt that we can consider the data of group relations as facts, but rather as arguments upon which it is rational to attach some weight.

In insisting upon demonstrative fact for decision making we may start the art and science of management along paths which are impossible to retrace, and which lead to socially untenable positions without ever having consciously chosen the destination at which we have arrived.

Summary

The brief here has been for a broad re-evaluation of operations research. It suggests that this evaluation must consider OR as a technique of mathematically programming managerial decisions; that these techniques may be applied to strategic or to tactical problems; and finally that there are some serious philosophical implications for management theory which should be considered before adopting operations research in such applications as group relations, or investigating mathematicians or industrial engineers with an important role in designing the machinery of managerial decision making.

The observations given here are by no means intended as a criticism of the motives nor technical methods of mathematical programmers. Nor is the need for evaluation suggested here an entirely new one. The problem of conflict between the technician and the philosopher is neither all black nor all white. It is at the heart of a fundamental conflict which engulfs the world, and in which the ultimate answer is not known, although we may have confidence that our own liberal position is tenable in the long run. No problem of modern management is greater than the proper choice of method by which management makes decisions, with the one exception being the selection of proper goals. It is in the light of these goals that decision making systems must ultimately be evaluated, rather than their quantitative efficiency. Further, these goals are too important to be entrusted entirely to the mathematicians for their definition.

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